Left ventricular global function index: Relation with infarct characteristics and left ventricular ejection fraction after STEMI

Reinstadler SJ[1], Klug G[1], Feistritzer HJ[1], Mayr A[2], Aschauer A[1], Pernter B[1], Schocke M[2], Franz WM[1], Metzler B[1]

[1] University Clinic of Internal Medicine III, Cardiology and Angiology, Innsbruck Medical University, Austria
[2] University Clinic of Radiology, Innsbruck Medical University, Austria

Background

The left ventricular global function index (LVGFI) is a novel indicator of cardiac performance. In healthy individuals, decreased values are strongly associated with adverse cardiovascular events. It's role in patients after acute myocardial infarction is unknown.

Methods

STEMI patients (n = 226, mean age: 57 ± 11 years, 15 % female) reperfused by primary PCI underwent contrast-enhanced cardiac magnetic resonance imaging (CMR) within the first week after index event. Cine CMR images in short-axis were acquired using breath hold, retrospective ECG-triggered trueFISP bright-blood sequences. The LVGFI was determined according to the formula:

$$LVGFI[\%] = \frac{LVSV[ml]}{LVGV[ml]} * 100$$

The left ventricular global volume was calculated according to the following formula:

$$LVGV[ml] = \frac{LVEDV[ml] + LVESV[ml]}{2} + Volume_{LVmyocardium}$$

Infarct characteristics (microvascular obstruction, infarct size, location and transmurality) were determined ten minutes (late enhancement) after an intravenous gadolinium bolus injection.

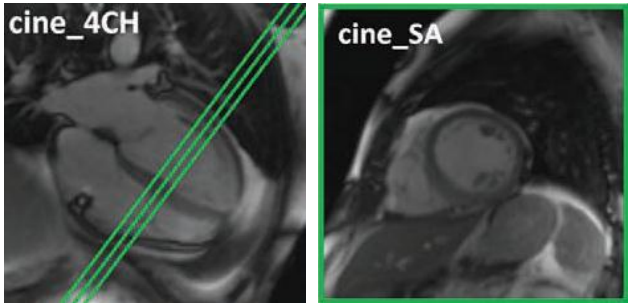

Figure 1: *Example of cine 4CH and SA views for volumetric assessment of LV volumens and mass*

Variables	ß Coefficient	P-value
Gender (0 = female, 1 = male)	- 0.108	0.063
Infarct size, % of myocardial mass	**- 0.163**	**0.031**
Microvascular obstruction (0 = absent, 1 = present)	**- 0.324**	**0.001**
Infarct location (0 = non-anterior, 1 = anterior)	**- 0.182**	**0.003**
Transmural infarct (0 = no, 1 = yes)	- 0.022	0.746

Table 1: *Multiple linear regression analysis with LVGFI as dependent variable (Model: R = 0.53, p < 0.001).*

Results

The mean LVGFI was 32 ± 8 %. LVGFI was inversely related with peak creatine kinase (r = -0.46), peak cardiac troponin T (r = -0.45) and CMR-determined infarct size (r = -0.42, all p < 0.001). Significantly decreased LVGFI values were also observed in patients with microvascular obstruction and anterior STEMI (all p < 0.001).

In addition, there was a strong correlation between LVGFI and left ventricular ejection fraction (r = 0.91, p < 0.001) as well as LVSV (r = 0.58, p < 0.001). An inverse relationship was observed between LVGFI and LVESV (r = -0.63, p < 0.001), LVEDV (r = -0.18, p = 0.008) and LV myocardial mass (r = -0.40, p < 0.001).

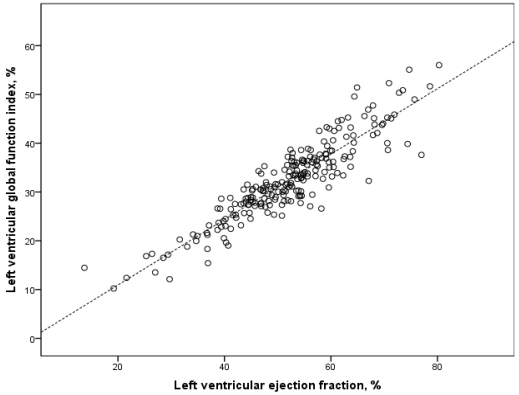

Figure 2: *Linear correlation between left ventricular global function index and left ventricular ejection fraction (r = 0.91, p < 0.001) in patients after acute STEMI (n = 226).*

Conclusion

This study demonstrates that the LVGFI is associated with infarct characteristics and left ventricular ejection fraction in patients after acute STEMI. LVGFI might be an useful functional parameter of the left ventricle, but its role as a prognostic marker needs to be determined in large outcome trials.